THE APPLICATION OF THE THEORIES OF PUBLIC REGULATION TO THE MANAGEMENT OF UTILITIES

By Douglas A. Graham

Regulation or control of public utilities must do justice to both the public and the utility or it cannot endure. Much has been said and written concerning the rights and interests of the people, and, in some cases at least, statements have been made with so small an understanding of the object of just utility regulation as to make it appear that the rights of the people are in jeopardy and that the authors of these statements are advocates in the case of "The People versus the Corporations."

This condition of affairs is not and should not be the case. The contention of the utilities in demanding fair returns is based on the provisions of our national constitution which refer to property rights, and, while the people have the right to demand efficient service in return for the privileges granted by them, they must be prepared to pay for what they receive. In other words the interests of both parties can best be served by devising fair and simple means of providing a fair return to the utilities in return for adequate service furnished to the public.

Millions of dollars are invested in public utility properties, and, when such money is devoted to the public use, the public must feel its responsibility toward such capital and must treat it with wisdom and justice.

FUNDAMENTAL PRINCIPLES

The fundamental requirements of just regulation may be stated under three headings.

1. To provide a fair return on the investment at all times.
2. To protect the capital invested so that it may remain intact or ultimately be returned to the investor.
3. To promote efficient management and to require adequate and satisfactory service.

Much has been written about the theories of regulation and there is little real difference in opinion among men who have knowledge of these matters. Less has been said and done to devise means for putting these accepted theories into practice and still less attention has been given to helping the utility operator to understand and apply these principles to his own particular property.

The movement toward public regulation by commission has spread rapidly of late years and, in general, it has been welcomed by both the utilities and the people. Unfortunately the subject of just and practical regulation is a difficult and complicated one and the rapid growth of the movement toward state control has created a demand for more men skilled in these matters than the profession has been able to supply. It may almost be said that the movement toward public regulation has grown more rapidly than the knowledge on the subject itself, and the result has been that commissioners have been forced, in many cases, to solve their problems as they have arisen, often without the aid of those especially trained in the work. Unfortunately this lack of preparedness and the newness of the field has sometimes led to an exaggeration of the value of precedent, and many opinions, methods and rules, inspired in the past by the necessity of arriving at some conclusion, have been perpetuated, simply because "precedent" furnished the necessary semblance of authority.

Nothing is further from the mind of the writer than that he should presume to criticise or question the ability or fairness of any of the men who are entrusted with the solution of the important problems of utility regulation. The errors that have been made, if they may be termed as such, are not errors of intent or lack of skill. They are due to the magnitude and newness of the problem, to the lack of special training in many of the men engaged in the work, and to the fact that few of the men so engaged have learned by experience the viewpoint of the utility.

It has been well said that no engineer, however skillful, is competent to appraise a utility plant until he has been employed by both a utility and by a city, as only in this way can he understand the viewpoint of each in such a manner as to do justice to both in his future work. Regulating bodies are employed by the people and are constantly in danger of being suspected of favoring the corporations, and it is only by a strict judicial impartiality and an earnest endeavor to understand the viewpoint of both parties that a regulating body can do justice to both the public and the owners of the utilities.

It is earnestly hoped, therefore, that the spirit of antagonism between the people and the utilities may give place to a spirit of mutual endeavor to obtain efficient service for just compensation, and that the governing bodies will give careful attention to the claims of the utilities and solve the contended problems, not on the precedent in the case, which may have been set by lesser minds than theirs, but upon a full knowledge and understanding of the facts and a fearless adherence to logic and justice.

It is not the intention of this paper to discuss or to attempt to substantiate the fundamental theories mentioned above. It is rather the application of these theories to the management of a utility that the writer has in mind, and it is hoped that some of the suggestions offered will bring out discussion and perhaps aid in the adoption of simple and fair methods which can be easily understood and applied by the utility manager. When such rules are worked out uniform systems of accounting may be adopted and the labor of supervision and regulation will be materially reduced.

CAPITAL ACCOUNTS

The first step in preparing for public regulation or, in fact, in preparing for the intelligent supervision of a property for any purpose, is to determine its value. This can rarely be done from past construction accounts owing to the appreciations and depreciations which have taken place and to the usual inaccurate or incomplete condition of these accounts. In most cases an appraisal of the property is necessary and such an appraisal should be authoritative, and, if possible, it should be concurred in by the body by which the utility is to be regulated.

After the present value of the property is determined, the old capital and depreciation accounts may be reconciled with the new value. The total value of the property may then be subdivided in accordance with the details of the appraisal and the requirements of intelligent supervision. New detailed construction accounts may then be opened and future construction charged at cost.

All materials and labor for new construction should, of course, be charged to these accounts in the future. There are some other items, however, which may properly be mentioned as their inclusion in construction accounts has been the subject of some discussion.

Discount of bonds sold for construction seems unquestionably to

be a proper charge against the construction accounts of a growing utility. There has been much discussion of this subject in connection with the valuation of an entire property, where interest during construction, going value, preliminary costs and the like are to be computed. It is not the intention of the writer to discuss this phase of the subject or to admit that there is any difference between the two cases, but in an operating utility, where money must be raised by selling bonds, the cost of selling these bonds must be paid just as surely as the cost of labor and material. If $90 worth of construction is to be undertaken and the bond discount is 10 per cent, then $100 worth of bonds must be issued and redeemed in cash at par upon the expiration of their terms. Ultimately, therefore, the utility must pay the bond discount in cash and the cash cost of the new construction must be charged to the assets of the company as $100.

Overhead costs are often neglected in charging construction to the books because of the difficulty of determining their amount. The overheads on a small extension may be insignificant, but, when a number of extensions have been made, the total of the overhead costs may amount to a considerable sum.

During the construction season the manager or superintendent devotes part of his time to the construction work, and a charge to construction should be made for such time. Automobiles may be used partly for construction purposes and, therefore, a part of their operating costs and depreciation should go to capital accounts. There is interest lost before new construction is completed and its fixed charges can be carried in operating accounts, and there are costs for business investigations and negotiations, in connection with new construction, which are not properly a part of the operating charges. Engineering, of course, must go in with the cost of the structure for which it is procured, but, as this is usually a separate account, it is easily charged directly, and is, therefore, not a part of the indefinite overhead costs to which this article directly refers.

Such costs, and others not specifically mentioned, are a real part of construction costs and should be charged as such. The amount of these charges is, however, a difficult matter to determine in the average plant. It is possible to so divide the charges and the time of all employees as to obtain an accurate distribution of all overhead costs, but such a system would involve so much labor, and such skilled accountants, that it is beyond the reach of the average sized

utility. Perhaps the best solution of the difficulty, and one which may be made fair to all concerned, is to determine an average percentage to be charged to all construction work and to be based on the cost of the material and labor items that can be easily determined.

The amount of this percentage may vary with the size of the plant, and it will be materially affected by the number of indefinite items which it is possible to charge directly to the construction accounts. In plants in cities of 20,000 to 30,000 a 10 per cent charge will probably be reasonable, although such a percentage must not be adopted without a thorough knowledge of the items which it is intended to cover. Also, all items should be charged direct as far as it is practicable to do so and the amount of the percentage for overheads thereby reduced to a minimum.

Operating capital is sometimes lost sight of in fixing rates, though it is as much a part of the capital devoted to the public as is the money invested in machinery. Operating capital may be defined as "that capital which is not invested in permanent structures or apparatus, but which is necessary for the operation of the business and which cannot be withdrawn or used for other purposes." It includes cash in the bank or in any other form in which it may be used upon demand, and also the capital temporarily invested in tools, supplies and the like. Such money is devoted to the business and it can receive no return unless it is included in the value upon which a fair return is to be computed. It should, however, be kept separate from the fixed or construction capital as it is variable and its depreciation should be treated separately.

Operating capital must not be confused with capital invested in non-operating property, such as lands bought in advance of their actual need. The writer believes that, in valuing a plant, no distinction should be made between operating and non-operating property, unless it can be clearly shown that the investment in property, not actually "used and useful" for the service of the public, was not made in the sole interest of the utility plant.

If property is non-operative because of obsolescence or poor condition, its value should be reduced or perhaps totally removed by means of the depreciation placed upon it, care being taken to consider all of the uses, both present and future, to which that particular property might be adapted. If the property is a piece of land, bought in anticipation of the needs of the plant, it should be considered that the management acted in good faith, unless the re-

verse can be clearly proven. To exclude such land because it is not now actually in use, is to discourage the utility from anticipating and providing for the future needs of the plant.

The object of keeping detailed construction accounts is to be able to consider intelligently costs of construction and operation. The division of these accounts should, therefore, conform to the units of a property for which cost data are commonly available. For example, the important general divisions of a water works plant are the water supply, the purification plant, the pumping station, the distribution system and one or more divisions for general costs, applying to the entire plant, such as overhead costs and going value. Land should be subdivided and charged with the division to which each part belongs. Other general subdivisions may be made, if necessary, to suit the requirements of each particular plant. The available costs of filtration are mostly in the form of construction costs per million gallons daily plant capacity, and operating costs per million gallons filtered, and one must know the value of the filter plant as a unit in order to compare its value with that of other plants, or to figure the element of fixed charges in finding the total unit cost of purification.

The subdivision of the main construction account headings will vary considerably in several plants and must be suited to the needs of each. In general it may be said that the classification should be based on the estimated lives of the various parts of the plant. While it is not intended to prescribe a definite form for the classification of construction accounts, the following arrangement is offered merely as an illustration of the principles discussed above:

CLASSIFICATION OF CONSTRUCTION ACCOUNTS

Intangible capital
- Organization and preliminary costs
- Going value

Water supply capital
- Lands
- Well houses and equipment
- Miscellaneous equipment

Purification capital
- Lands
- Buildings
- Filters
- Pumps
- Blower and motors

Purification capital—Continued
- Miscellaneous equipment
- Upper storage basin
- Lower storage basin

Pumping station capital
- Lands
- Main buildings and stack
- Miscellaneous outbuildings
- Boilers and breeching
- Feed pumps and boiler accessories
- Pumping machinery
- Electrical machinery
- Miscellaneous equipment
- Ground improvements and switch track

Distribution system capital
- Cast iron pipe mains and valves
- Hydrants
- Pavement over C. I. pipe mains
- Wrought iron pipe mains and valves
- Pavement over W. I. pipe mains
- Service connections
- Meters

Overhead construction capital
- Interest, administration, superintendence and miscellaneous costs @ 10 per cent of material and labor cost
- Legal expense.
- Injuries and damages
- Insurance
- Discount or commission on construction bonds

Operating capital
- Cash on hand
- Stores and supplies
- Tools and appliances

A very convenient summarized construction account book for a small plant, may be made from an ordinary column-ruled book which can be purchased at a stationery store. The general headings and subdivisions may be written at the top of each page and the accounts opened with the details from the appraisal, a column at the right being used for totals. The item may be described at the left and the total cost entered in the proper column. Such a book would give an up to date classified record of the value of the plant and would be very valuable in making annual reports.

DEPRECIATION

The treatment of depreciation and the computation of the amounts of the annual charges for this item, are among the most difficult of the problems with which the utility manager is confronted. In the competitive commercial world the depreciation account is purely a matter of business policy, but where a utility is under public control, and the obligations of the public and the corporation are mutual, depreciation is no longer a matter of policy but becomes subject to the laws which govern the fixing of a fair return.

The presumption in fixing rates is that the utility shall earn a fair return on the value of its property, and in addition an amount annually which will be sufficient to make good the depreciation losses. It is generally conceded that an allowance should be made for depreciation in the revenues, but the manner of computing this allowance and of treating it in the book accounts is still the subject of much discussion and difference of opinion.

The allowance for annual depreciation must cover future losses only, as the courts have held that a utility cannot make charges in the future to compensate for losses in the past. It is this principle which makes it essential that the depreciation allowance be actually received before it is deducted from the capital, for an allowance on paper only is misleading and is of no practical benefit to the utility. The question of the actual receipt of the depreciation allowance will be considered more fully under the heading of Fair Return, and the following discussion will assume that the depreciation allowance is to be actually received.

The first and perhaps the most important question to be decided, in determining the manner in which the depreciation allowance shall be treated, is whether it shall become a part of a replacement fund, out of which replacements or renewals will be made, or whether it shall be considered as a partial repayment, by the public to the utility owners, of the capital devoted to the public use. The principles involved are the same in each case as by either plan the investment is maintained intact. The former plan is familiar to the general public but it has many drawbacks. The latter plan, which appears to have many advantages, was suggested by a special committee of the American Society of Civil Engineers in their recent report on "Valuation for Rate Making Purposes."

The replacement fund method involves the estimation of the

depreciation of all of the details of a plant and an accurate distinction between that part of a new structure which is a replacement and that which is an improvement. An old machine is never replaced by a new one of exactly the same size and kind. There is always some improvement. A replacement fund is made up of annual increments which will replace each part of the plant as its life comes to an end. When a new machine is installed it is necessary, therefore, to take part of its cost from the replacement fund and part must be paid with new capital. If the life of the old machine has been accurately estimated, this is not a very difficult proceeding, but if this life has not been exactly predicted, the provision for amortizing the value of the old machine is either insufficient or more than enough and it is a difficult matter to determine just what part of the new cost shall be taken from the replacement fund. In short the accurate maintenance of a replacement fund requires a system of accounting beyond the reach of most utility companies, and, unless such a system is faithfully carried out, the replacement fund loses much of its merit and becomes largely a matter of guess work.

In the repayment method, as its name suggests, the depreciation allowance is considered as a repayment of the invested capital, to be deducted from the capital account and used as new capital. The merit of this plan is its simplicity as, when the amount is fixed by careful appraisal, it is handled as a lump sum and no tedious details are necessary. All replacements or additions are charged in full to capital accounts and the annual depreciation allowances are deducted from the plant value. The results obtained with this plan are the same as those with the replacement fund, as, in each case, if all worn-out structures were to be replaced with identical new ones, the construction account would always remain the same. The difference between the two methods is one of accounting only, but the simplicity gained by the treatment of depreciation as a lump sum repayment of capital is worth much to the utility manager.

There are three plans which have been devised for computing the amount of the annual depreciation allowance. These are the sinking fund, the straight line and the equal-annual-payment plans. All three require an estimate of the present value of the plant and its composite remaining life.

The sinking fund method is familiar to all. The annual allowance is the increment to a sinking fund which will retire the investment

at the end of its life. This method requires the creation of an actual sinking fund for replacements as its interest additions each year must come from the investment of the fund. Few companies care to carry an actual sinking fund on account of the low interest rates which can be earned by such a fund. Also there are serious accounting difficulties which arise when the working of the sinking fund principle is disturbed by the removal of money for replacement purposes and by the constant changes in the composite life of the plant, due to additions and alterations. It is believed that in practice the theoretical working of a replacement fund on the sinking fund principle can only be approximated at best, and the difficulties involved are quite enough to discourage the ordinary utility manager.

The straight line method of computing the annual depreciation allowance commends itself by its simplicity. Under this plan the total physical value of the plant is divided by the number of remaining years of the composite life of the property and the result is the annual depreciation charge. It has two serious objections, both due to the fact that its amount is the same from the beginning to the end of the plant life.

Experience shows that actual depreciation is small during the early years of the life of a plant and that it increases rapidly during the later years of operation. The sinking fund method is designed to approximate the working of this law but the straight line method produces results which are too great during the early years and too small during the later years of the life of a plant. Also the straight line allowance bears no relation to the probable income which a plant will receive. It imposes too heavy a burden during the early years of development and it is too small during the later years when the income is more fully developed. This method, therefore, while simple in operation, is absolutely arbitrary and is not well suited to the requirements of a public utility.

There is another method, also suggested by the committee of the American Society of Civil Engineers which has been referred to above. It has been called by it the equal-annual-payment plan, and takes its name from the fact that by its use, at any given interest rate and considering no additions to the plant, the total of the depreciation allowance and the fair return is the same each year during the life of the plant. If plant additions are considered, the constant amount of the depreciation plus fair return changes to a constant percentage of the total plant value.

The equal-annual-payment or E-A-P plan is, in fact, a modified sinking fund in which the interest accretions are added directly to the annual charge instead of being earned by the fund itself. This plan eliminates the complications of the sinking fund while preserving its advantages, and seems to offer a satisfactory solution of the problem.

The following table illustrates the working of the rule as applied to a given set of assumptions.

Example of working of E-A-P depreciation rule

Assumptions: Initial investment $100. Additions $5 per year. Average life of original plant 20 years; life of each addition 20 years

AGE, YEARS	FULL INVESTMENT AT END OF YEAR	DEPRECIATION DURING YEAR (5 PER CENT RATE)	NET VALUE END OF YEAR	5 PER CENT ON NET VALUE	DEPRECIATION PLUS RETURN	PER CENT OF INVESTMENT PAID BY PUBLIC IN FAIR RETURN AND DEPRECIATION ALLOWANCE
	$100.00	$3.02	$100.00	$5.00	8.02	8.02
1	105.00	3.32	101.98	5.10	8.42	8.02
2	110.00	3.64	103.66	5.18	8.82	8.02
3	115.00	3.97	105.02	5.25	9.22	8.02
4	120.00	4.32	106.05	5.30	9.62	8.02
5	125.00	4.69	106.73	5.34	10.03	8.02
6	130.00	5.07	107.04	5.35	10.42	8.02
7	135.00	5.48	106.97	5.35	10.83	8.02
8	140.00	5.90	106.49	5.32	11.22	8.02
9	145.00	6.35	105.59	5.28	11.63	8.02
10	150.00	6.82	104.24	5.21	12.03	8.02
11	155.00	7.31	102.42	5.12	12.43	8.02
12	160.00	7.82	100.11	5.01	12.83	8.02
13	165.00	8.37	97.29	4.86	13.23	8.02
14	170.00	8.94	93.92	4.70	13.64	8.02
15	175.00	9.53	89.98	4.50	14.03	8.02
16	180.00	10.16	85.45	4.27	14.43	8.02
17	185.00	10.82	80.29	4.01	14.83	8.02
18	190.00	11.51	74.47	3.72	15.23	8.02
19	195.00	12.24	67.96	3.40	15.64	8.02
20	200.00	13.00	60.72	3.04	16.04	8.02

The resulting total charge for fair return and depreciation is a constant per cent on the full investment at the end of each year.

The rule for finding the depreciation each year under this method is as follows: Find the remaining life of the plant, which would

be say 45 years, and decide on the sinking fund interest rate to be used, say 4 per cent. Find the annual increment to a 4 per cent 45 year sinking fund, which would be 0.8262 and which would be the charge for the first year. The second and succeeding years the allowance would be the charge for the previous year, plus 4 per cent of that charge, plus 0.8262 per cent of the increase in plant value during the preceding year.

The following table gives the factors for finding the first year's depreciation allowance, computed at four different sinking fund interest rates.

E-A-P depreciation factors

REMAINING COMPOSITE LIFE OF PLANT	FACTOR IN PER CENT FOR FIRST YEAR			
	4% rate	*5% rate*	*6% rate*	*7% rate*
5 years.....	18.4627	18.0975	17.7396	17.3891
10 years.....	8.3291	7.9505	7.5868	7.2377
15 years.....	4.9941	4.6342	4.2963	3.9795
20 years.....	3.3582	3.0243	2.7185	2.4393
25 years.....	2.4012	2.0953	1.8227	1.5811
30 years.....	1.7830	1.5051	1.2649	1.0586
35 years.....	1.3577	1.1072	0.8974	0.7234
40 years.....	1.0524	0.8287	0.6462	0.5009
45 years.....	0.8262	0.6262	0.4700	0.3500
50 years.....	0.6550	0.4770	0.3444	0.2460
60 years.....	0.4202	0.2828	0.1876	0.1229

The simplicity of the E-A-P plan, the nearly constant relation of its annual increment plus the fair return to the changing value of the plant, the percentage being only constant when the same interest rate is used in computing both depreciation and fair return, and the growth of its annual increment with the development of the business of the company, recommend it very highly for use in the management of a utility property.

Few utilities in this part of the country have carried depreciation accounts until the last few years and, where such accounts have been kept in the past, they have often been little more than memoranda. The amounts charged have usually been variable and not in accordance with any definite rule or principle and, as far as practical benefit to the utility is concerned, such accounts might just as well have never been created. The growing tendency toward

public control has inspired the opening of many depreciation accounts and the newness of the problem of public control, combined with lack of knowledge of plant values, has been largely responsible for the haphazard manner in which depreciation accounts have been treated in the past.

The writer believes that the most important factor in determining the proper treatment of depreciation in the operating accounts is the amount of depreciation the property is actually permitted to earn. This bears directly upon the much debated question of whether or not the depreciation allowance should be deducted from capital. Under the well accepted theory that a utility is entitled to receive a fair return and to be permitted to maintain its property value intact, it is obviously unfair to deduct depreciation from capital if such depreciation allowance is not actually earned in addition to a fair return. Also, if money is actually provided for depreciation, it must either be put back into the property by means of replacements without increasing the capital accounts, or it must be deducted from capital accounts and be considered as invested capital which has been returned or repaid by the public.

The writer makes no pretenses of being an accountant, and he is familiar only from general knowledge with the requirements of a plan of utility accounts. His experience and association with those engaged in this work, however, have taught him some of the difficulties to be avoided and the objects to be achieved. It is believed that the choice of methods for handling annual depreciation lies between the replacement fund and repayment plans described above, and, on account of the almost insurmountable difficulties in the way of the practical fulfillment of the replacement principle, it is believed that the depreciation should be treated as a repayment of the invested capital.

In planning the accounts on the repayment plan depreciation may be charged directly to profit and loss and credited to construction, or it may be carried through a separate depreciation account. The cash repayment may be charged to general cash and credited to a special cash account from which it is to be used as new capital. Other similar combinations will produce the same results. No detailed estimate of depreciation is necessary as all new and replacement capital is charged in full to construction.

In computing the annual depreciation charge, as explained above, operating capital may well be excluded. The depreciation on tools

and construction appliances should be added to the construction accounts. Depreciation on very short lived property used in the operation of the plant may properly be charged as operating expenses direct.

There are certain contingent depreciations which occur occasionally during the life of every plant. A fire may cause unexpected damage or an accident may destroy some of the machinery. A runaway may break a hydrant or a main may burst. Such unexpected depreciation is sure to occur at some time, and an allowance should be made for it in the annual charge for depreciation.

FAIR RETURN

The principles governing the operation of public utilities are pretty well understood, and it is conceded that a property is entitled to fair earnings on its investment in return for efficient service to the public. The application of these principles is quite another matter and the results obtained in the past have not been altogether satisfactory. Fairly definite estimates may be made of operating expenses, but the consumption of the various classes of consumers, the future increase in their number and the changes in plant value, are matters so indefinite as to make it extremely difficult to fix rates which will furnish exactly a fair return on the property.

In a growing city, an increase in business must be expected, and it is probable that such growth in income will exceed the increase in operating expenses, fixed charges and fair dividends. Rates cannot be revised each year and it is easily seen, therefore, that the problem of providing a fair return at all times is a difficult one.

In the past, under municipal control, regulation has too often meant a reduction of rates whenever the opportunity offered itself, and the temptation to use the issue of reduced rates as political capital has often proved too strong. The arguments for rate reductions have nearly always included estimates of future prosperity, and rates have often been fixed on the theory that future increases would make up for present losses. Unfortunately, in such cases, when the future increases have taken place administrations have changed or memories have failed and the realization of the hopes of the utility for a fair return have once more been consigned to the future.

It is often difficult for the layman to understand the hardships

and losses attending the early years of the operation of a public utility. He sees only the present and future and he is guided more by the size of his own bills and by the campaign speeches of the city politicians than by any knowledge of the task involved in the construction and development of such a business.

Under such a system of political regulation in the past the utility business has too often been a gamble with the other fellow fixing the odds. In our own and many other states this system is happily in vogue no longer, and it is to be hoped that the new era of sound regulation upon which we are entering will bring out new methods of providing a fair return which will do away with some of the hazards which have attended on such business in the past.

As explained before it is the practice of regulation, rather than the theories involved, that is still the subject of debate. It is conceded that a utility should receive a fair return, but theories and concessions will not pay bond interest, dividends and depreciation. It is the problem of how actually to obtain a fair return at all times that is of vital interest to the utility manager. The public expects efficient service at all times and transgressions on the part of the company are not easily forgotten. In fairness, then, provisions should be made that will permit the company to enjoy a fair return at all times.

A simple way to accomplish this result may be termed the trust fund method. It contemplates the creation of a trust fund to which all profits would be carried and from which the utility would be allowed to withdraw a fair return each year. Such a plan would accomplish all the results desired by both parties. If the fund should grow too fast, rates could be reduced and if it were found to be insufficient, rates could be increased. By this plan the uncertainty would be removed from future estimates and the wisdom of a new schedule of rates could safely be left to the decision of a trial, without jeopardizing the interests of the public or of the corporation.

A general custom in business management is to charge all profit to a surplus account from which dividends are paid. This surplus, then, might well be used as the trust fund suggested. It would receive all profits above operating expenses and depreciation, and would be drawn upon to the amount of a fair return each year. Such a fund would be under the control of the regulating body and could be properly accounted for.

The operation of the trust fund plan would be simple. With

the books reconciled to an approved valuation and continued with actual costs, with readjustments at infrequent periods when necessary; with the depreciation allowance treated as a repayment of capital on the equal-annual-payment plan; and with the operating and other accounts under the supervision of the accountants of the regulating board; this plan seems to solve the problem of actually providing the return which is awarded to the utility.

EFFICIENT MANAGEMENT

Equally important with the actual providing of a fair return is the enforcement of efficient and satisfactory service. As the weakness of past systems of regulation has been in the failure to actually provide a fair return, so the fundamental weakness in past requirements for good service has been the lack of incentive given the utility to improve its service. Standards of purity of water, pressure and the like should vary somewhat in different cities and a regulating commission can prescribe limits, more or less definite, to apply to each particular case. In matters of economy, however, the task of supervising the operation of all of the utilities in a state is too great for any organization so far established. Refinements in economy are suggested only to those operating a property or to those making a special study of the plant in question. It is to the utility manager, therefore, that we must look for material improvements in efficiency and, to enlist his efforts, an incentive must be provided.

In competitive business the standard for plant improvement is economy. If an old machine can be replaced by a new and more modern one, at a saving in annual cost fixed charges and depreciation included, good business dictates that the improvement shall be made, as by so doing the net earnings of the business will be increased. Consider now the position of the utility manager in such a case when his plant is operating under the present accepted methods of public control. The commission probably does not know that the old machine can be profitably discarded, so the change would be voluntary on the part of the company. Rates have been fixed on the basis of present plant value and operating expenses, and the utility is getting a fair return. If the manager discards the old machine he must furnish capital for the new one, and it may be that there has been an insufficient allowance for the depreciation of the old one. His assets, therefore, are likely to be reduced by the

change and his only reward for his trouble and expense is a decrease in operating expenses and a consequent increase in earnings. If the regulating body had allowed him 7 per cent return he may have increased this to 7¼ per cent by increasing his plant efficiency. But the commission has only allowed him a 7 per cent return and his efforts have, therefore, entitled the public to a reduction in the rates which, when accomplished, will leave the utility where it began.

Another phase of the same difficulty is the effect of developing the business. In general, the larger the amount of business done by a utility per capita of population the lower the rates may be to produce a fair return. Public welfare, therefore, dictates that the utility business of each community should be fully developed, both for the reason just mentioned and also because the prosperity of a community bears a close relation to the efficiency and widespread use of its public utilities. Yet, on the fixed-percentage-of-return system of regulation, the enterprising manager who, by skill and labor, builds up the business of his company gains no advantage over his brother in the next city whose business has been less fully developed.

It is obvious, therefore, that the common practice of awarding a fixed percentage of fair return takes away from a utility manager all incentive for improving his property, except that which may be furnished by his pride in his own plant or by the orders of the governing board on matters which come to their attention.

The only practical solution of this problem is to put a premium on efficiency by giving the utility a share in the results of its labors. If improvements in a plant produce savings, both the public and the utility should benefit. The saving to the public can be cared for by reducing rates and the share to which the utility is entitled can, perhaps, best be provided by varying the percentage of fair return allowed.

In the application of the method of a graduated-fair-return, the normal fair rates must first be fixed for the particular plant under consideration. The utility would then be permitted to earn an increased percentage of fair return only on condition that rates be lowered below the normal. To illustrate, let us assume a water works plant for which a 7 per cent fair return has been provided, by means of a sliding scale of rates varying from 10 cents to 30 cents per thousand gallons. The application of the variable return principle would then permit the utility to earn a 7½ per cent return,

when they had given the consumers a discount of 5 per cent on their bills; and 8 per cent return when the consumer's discount reached 10 per cent and so on. These figures are used purely for illustration and the writer does not know if they even approximate the scale which should be adopted. The proper scale can only be found by careful study, but the principle seems to be right and it appears to be practical of application. It is earnestly hoped that efforts will be made to adopt some such plan as this in order to overcome the fatal lack of incentive for increased economy which is inherent in the present systems of utility regulation and which is opposed to the interests of both the public and the corporations.

Another thought, which comes in connection with the question of a graduated fair return, is the possibility of adopting standard rates throughout the entire district controlled by one regulating body. This suggestion is offered merely for discussion by those interested, but seems to the writer to merit more consideration than might at first appear. A public utility is a business and it is, therefore, only reasonable that business acumen in the selection of a desirable field of operations should receive some reward. The tendency of most of the methods of regulation seems to be to put all utilities alike on the basis of property value without regard for the cost of the service furnished.

Utility properties differ widely in desirability from the standpoint of cost of production. Some water works plants must filter their water and pump it twice; others must pump from a lake or well without filtration, and still others have water delivered to them under pressure, from flowing wells or springs. With competition, in the same locality, the plant whose cost of production is high would be driven out of business. Under a system of fair return on property value, however, no distinction is made between plants whose cost of production differs on account of the characteristics of the community. The wisdom of this policy is open to question as the utility is not called upon to share any of the burden of high cost of production, where such is found, nor is it permitted to benefit by the low rates, where the cost of production is low.

The solution of this problem seems to be the consideration of the effect on fair rates of the value of the service to the consumer, and the adoption of standard or normal rates, combined with a graduated fair return, might be the answer to the question. In the application of this principle, the city favored by conditions which

promote economical production would enjoy low rates and these, in turn, would increase the percentage of fair return to which the utility would be entitled. In a city where production cost is high the reverse would be true, and in both cases the utility and the public would share in the hazards and profits of the business.

It is believed that this plan merits careful consideration and the writer hopes that the suggestion will bring out discussion on the subject. It is probable that distinctions would need to be made between cities of different sizes and perhaps in other ways, but even a partial standardization of rates would simplify the work of the regulating board and would permit an intelligent comparison of rates in adjacent cities.

CONCLUSION

The subject of this paper is a broad one and the questions involved are large and difficult. The discussion of these problems has been lengthy and it may not be amiss to emphasize, by a brief summary, the more important suggestions which the writer desires to present for consideration.

1. Capital accounts should show the true value of the property and this value should preferably be approved by the body by which the utility is to be controlled.

2. The depreciation allowance should be considered as a repayment of the capital invested, all new construction and replacements being charged in full to capital, and the annual allowance being deducted from capital accounts and used in any way in which the company is permitted to use capital. The amount of the annual allowance should be figured on the equal-annual-payment-plan.

3. Provision should be made so that a utility will actually receive the fair return and depreciation allowance which is awarded to it. This may perhaps best be accomplished by regarding the surplus as a trust fund out of which the utility will be paid the earnings to which it is entitled.

4. Incentive for economical management should be provided, in addition to the well accepted requirements of satisfactory service. This can be accomplished by providing for a fair return percentage which will vary with the change in the costs of service to the consumer. This principle may perhaps be developed still further by the adoption of standard normal rates throughout an entire

state or district, so that both public and corporation may share in the advantages or disadvantages of the utility business in each community.

5. The treatment of all of the problems involved in regulation is intimately connected with the provisions to be made for assuring the utility that it will actually receive the returns which are awarded it, and the problems of determining the earnings for a utility and of actually providing them must be considered together.

In the forgoing discussion the writer has had the water utilities more particularly in mind, although most of the principles involved are applicable to all publicly controlled enterprises. It is hoped that the suggestions offered will be freely discussed and that the future may bring a better understanding and application of the theories of just utility regulation, to the mutual benefit of both the public and the utility corporations.